

## Operating Instructions

### VEGASWING 51

- transistor (PNP)

With extended status indication



Document ID:  
40552



Vibration

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# 1 About this document

## 1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

## 1.2 Target group

This operating instructions manual is directed to trained qualified personnel. The contents of this manual should be made available to these personnel and put into practice by them.

## 1.3 Symbolism used



### Information, tip, note

This symbol indicates helpful additional information.



**Caution:** If this warning is ignored, faults or malfunctions can result.

**Warning:** If this warning is ignored, injury to persons and/or serious damage to the instrument can result.

**Danger:** If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.



### Ex applications

This symbol indicates special instructions for Ex applications.



### List

The dot set in front indicates a list with no implied sequence.



### Action

This arrow indicates a single action.



### Sequence

Numbers set in front indicate successive steps in a procedure.

## 2 For your safety

### 2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

### 2.2 Appropriate use

The VEGASWING 51 is a sensor for level detection.

You can find detailed information on the application range in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

### 2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

### 2.4 General safety instructions

This is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards as well as all prevailing safety regulations and accident prevention rules.

The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

## 2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

## 2.6 CE conformity

This device fulfills the legal requirements of the applicable EC guidelines. By attaching the CE mark, VEGA provides a confirmation of successful testing. You can find the CE conformity declaration in the download area of [www.vega.com](http://www.vega.com).

## 2.7 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

## 3 Product description

### 3.1 Structure

#### Scope of delivery

The scope of delivery encompasses:

- VEGASWING 51 point level switch
- Test magnet
- Documentation
  - this operating instructions manual
  - if necessary, certificates

#### Constituent parts

The VEGASWING 51 consists of the components:

- Housing with electronics
- Process fitting with tuning fork

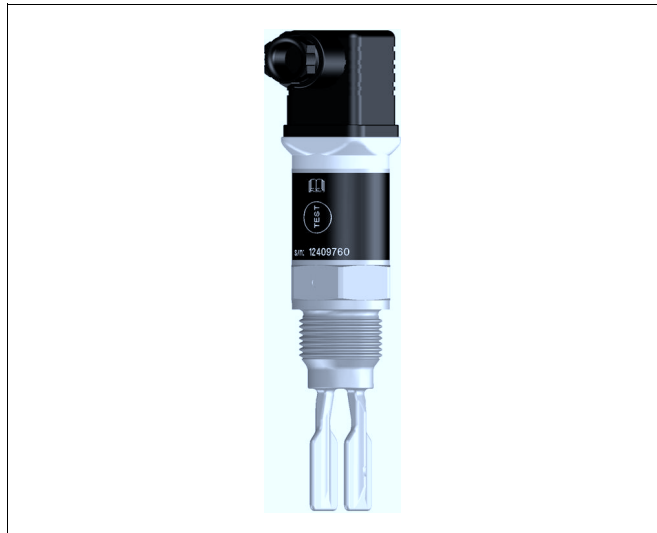


Fig. 1: VEGASWING 51

#### Type label

The type label contains the most important data for identification and use of the instrument:

- Article number
- Serial number
- Technical data
- Article numbers, documentation

With the serial number, you can access the delivery data of the instrument via [www.vega.com](http://www.vega.com), "VEGA Tools" and "serial number search". In addition to the type label outside, you can also find the serial number on the inside of the instrument.

## 3.2 Principle of operation

### Application area

VEGASWING 51 is a point level sensor with tuning fork for level detection.

It is designed for industrial use in all areas of process technology and can be used in liquids.

Typical applications are overflow and dry run protection. With a tuning fork of only 38 mm length, VEGASWING 51 can be also mounted e.g. in pipelines from DN 25. The small tuning fork allows use in vessels, tanks and pipes. Thanks to its simple and robust measuring system, VEGASWING 51 is virtually unaffected by the chemical and physical properties of the liquid.

It functions even under difficult conditions such as turbulence, air bubbles, foam generation, buildup, strong external vibration or changing products.

### Fault monitoring

The electronics module of VEGASWING 51 continuously monitors via frequency evaluation the following criteria:

- Strong corrosion or damage on the tuning fork
- Loss of vibration
- Line break to the piezo drive

If a malfunction is detected or in case of power failure, the electronics takes on a defined switching condition, i.e. the output is open (safe condition).

### Functional principle

The tuning fork is piezoelectrically energised and vibrates at its mechanical resonance frequency of approx. 1100 Hz. When the tuning fork is submerged in the product, the frequency changes. This change is detected by the integrated electronics module and converted into a switching command.

### Voltage supply

VEGASWING 51 is a compact instrument, i.e. it can be operated without external evaluation system. The integrated electronics evaluates the level signal and outputs a switching signal. With this switching signal, a connected device can be operated directly (e.g. a warning system, a PLC, a pump etc.).

The data for power supply are specified in chapter "Technical data".

## 3.3 Operation

The switching status of VEGASWING 51 can be checked with closed housing (signal lamp). Products with a density  $> 0.7 \text{ g/cm}^3$  (0.025 lbs/in<sup>3</sup>) can be detected.

### 3.4 Storage and transport

**Packaging**

The device was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test according to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

**Transport**

Transport must be carried out under consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

**Transport inspection**

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

**Storage**

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

**Storage and transport temperature**

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 ... 85 %

## 4 Mounting

### 4.1 General instructions

#### Suitability for the process conditions

Make sure that all parts of the instrument exposed to the process, in particular the sensor element, process seal and process fitting, are suitable for the existing process conditions. These include above all the process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" or on the type label.

#### Switching point

In general, VEGASWING 51 can be installed in any position. The instrument only has to be mounted in such a way that the tuning fork is at the height of the desired switching point.

Keep in mind that the switching point can vary dependent on the installation position.

The switching point refers to the medium water ( $1 \text{ g/cm}^3/0.036 \text{ lbs/in}^3$ ). Please keep in mind that the switching point of the instrument shifts when the medium has a density differing from water.

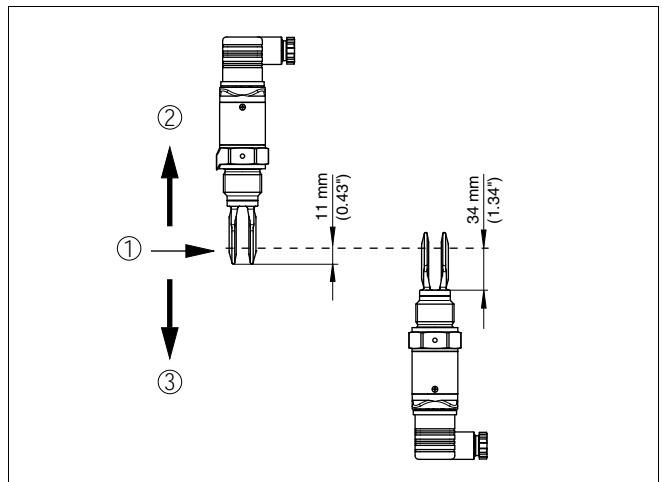


Fig. 2: Vertical mounting

- 1 Switching point in water
- 2 Switching point with lower density
- 3 Switching point with higher density

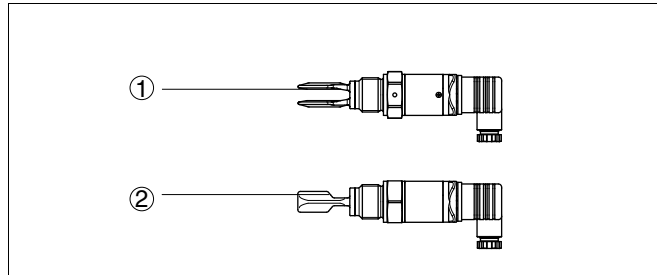


Fig. 3: Horizontal installation

- 1 Switching point
- 2 Switching point (recommended mounting position, particularly for adhesive products)

## Moisture

Use the recommended cables (see chapter "Connecting to power supply") and tighten the cable gland.

You can give your VEGASWING 51 additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

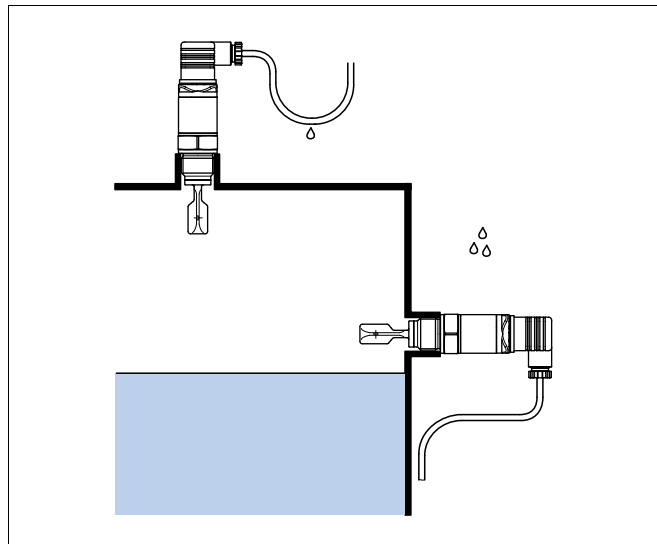


Fig. 4: Measures against moisture penetration

**Transport**

Do not hold VEGASWING 51 on the tuning fork.

**Pressure/Vacuum**

The process fitting must be sealed if there is gauge or low pressure in the vessel. Before use, check if the seal material is resistant against the measured product and the process temperature.

The max. permissible pressure is specified in chapter "Technical data" or on the type label of the sensor.

**Handling**

The vibrating level switch is a measuring instrument and must be treated accordingly. Bending the vibrating element will destroy the instrument.



**Warning:**

The housing must not be used to screw the instrument in! Applying tightening force can damage internal parts of the housing.

Use the hexagon above the thread for screwing in.

**4.2 Instructions for installation**

**Adhesive products**

In case of horizontal mounting in adhesive and viscous products, the surfaces of the tuning fork should be vertical in order to reduce buildup on the tuning fork. The position of the tuning fork is indicated by a marking on the hexagon of VEGASWING 51. With this, you can check the position of the tuning fork when screwing it in. When the hexagon touches the seal, the thread can still be turned by approx. half a turn. This is sufficient to reach the recommended installation position.

In adhesive and viscous products, the surfaces of the tuning fork should protrude into the vessel to avoid buildup. Therefore sockets for flanges and mountings bosses should not exceed a certain length.

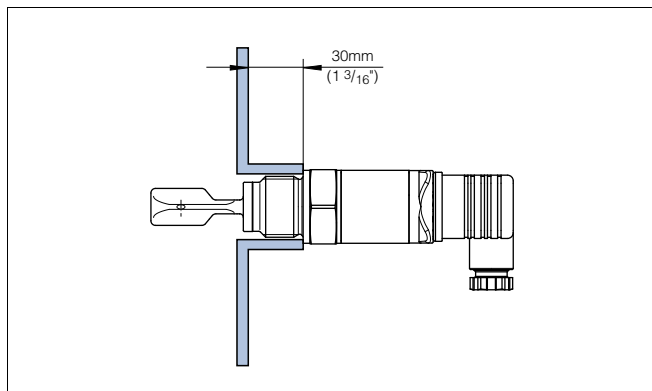


Fig. 5: Adhesive products

**Inflowing medium**

If VEGASWING 51 is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount VEGASWING 51 at a position in the vessel where no disturbances, e. g. from filling openings, agitators, etc., can occur.

**Flows**

To minimise flow resistance caused by the tuning fork, VEGASWING 51 should be mounted in such a way that the surfaces of the blades are parallel to the product movement.

## 5 Connecting to power supply

### 5.1 Preparing the connection

**Note safety instructions**

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage

**Connection cable**

The instrument is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use cable with round cross section. Depending on the plug connection, you have to select the outer diameter of the cable respectively so that the seal effect of the cable gland is ensured.

- Valve plug ISO 4400,  $\varnothing$  4.5 ... 7 mm
- Valve plug ISO 4400 with IDC crimping technology,  $\varnothing$  5.5 ... 8 mm

**Cable glands**

Use cable with a round wire cross section and tighten the cable gland.

When mounting outdoors, on cooled vessels or in moist areas in which cleaning is made with steam or high pressure, the sealing of the cable gland is very important.

## 5.2 Wiring plan

### Housing overview

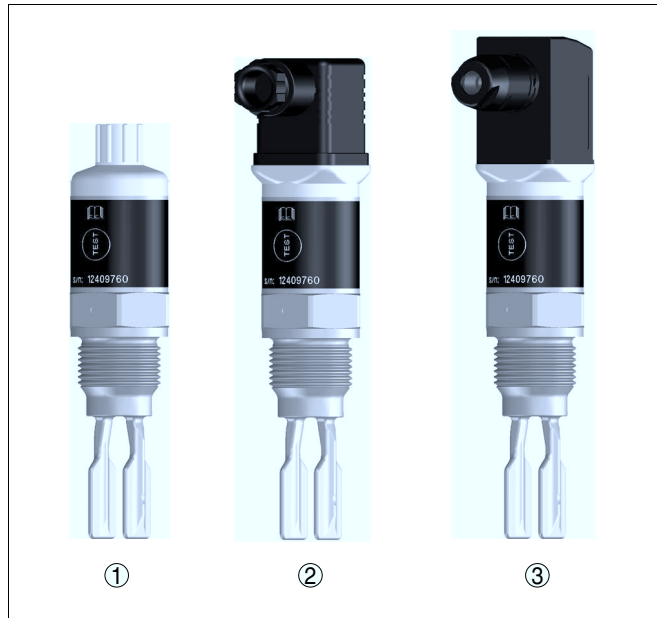


Fig. 6: Overview of the connection versions

- 1 M12 x 1 plug connection
- 2 Valve plug ISO 4400
- 3 Valve plug ISO 4400 with IDC method of termination

### Plug versions

#### M12 x 1 plug connection

This plug connection requires a prefabricated cable with plug. Depending on the version, protection IP 66/IP 67 or IP 68 (0.2 bar).

#### Valve plug ISO 4400

For this plug version, standard cable with round wire cross-section can be used. Cable diameter 4.5 ... 7 mm, protection IP 65.

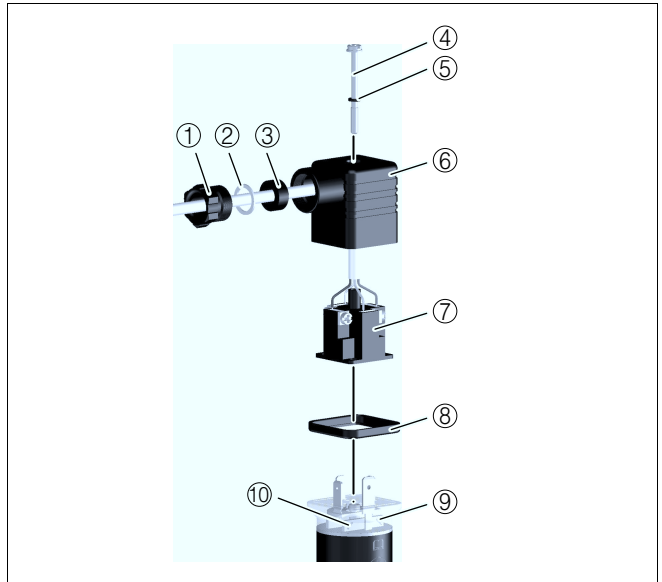


Fig. 7: Connection, valve plug ISO 4400

- 1 Pressure screw
- 2 Pressure disc
- 3 Seal ring
- 4 Fixing screw
- 5 Seal washer
- 6 Plug housing
- 7 Plug insert
- 8 Profile seal
- 9 Control lamp
- 10 VEGASWING 51

**Valve plug ISO 4400 with IDC method of termination**

For this plug version you can use standard cable with round wire cross-section. The inner conductors do not have to be stripped. The plug connects the conductors automatically when screwing in. Cable diameter 5.5 ... 8 mm, protection IP 67.

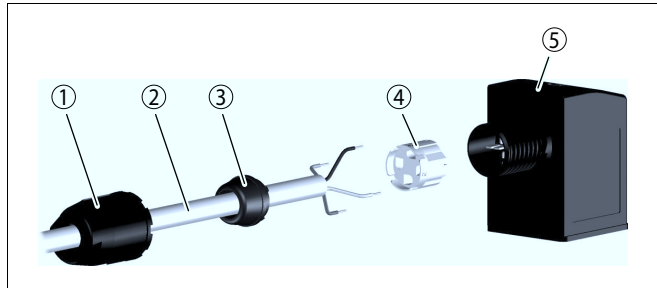


Fig. 8: Connection, valve plug ISO 4400 with IDC crimping technology

- 1 Compression nut
- 2 Cable
- 3 Seal ring
- 4 Terminal insert
- 5 Plug housing

### Transistor output

For connection to binary inputs of a PLC.

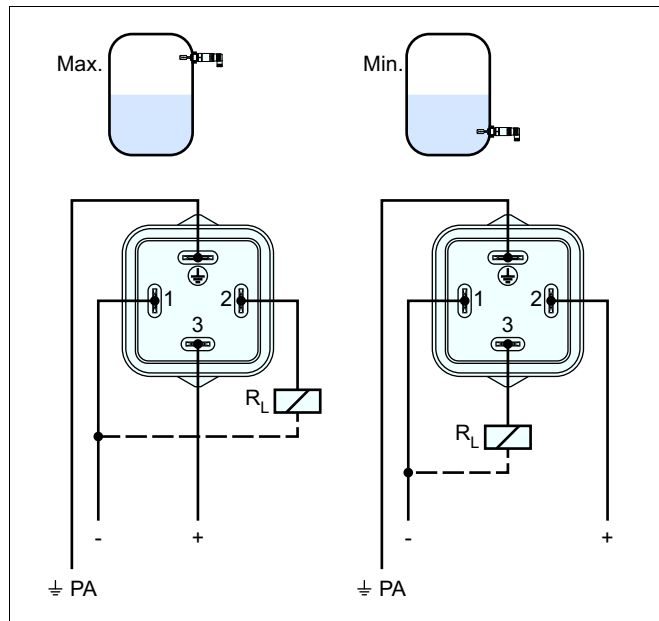


Fig. 9: Wiring plan, Transistor output with valve plug ISO 4400

PA Potential equalisation

$R_L$  Load resistance (contactor, relay, etc.)

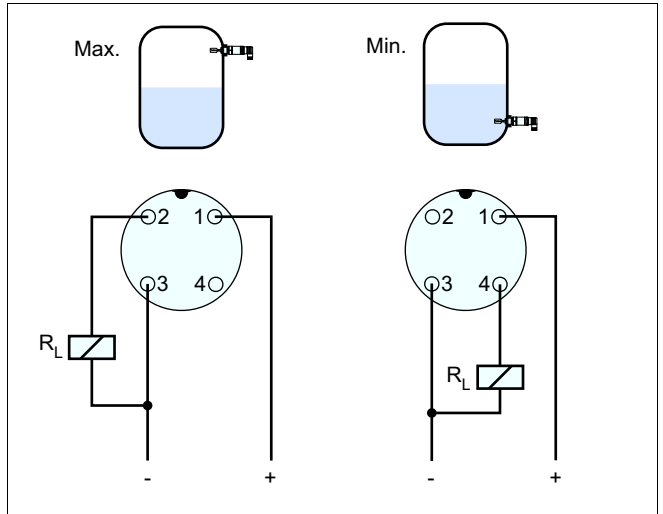


Fig. 10: Wiring plan (housing), transistor output with M12 x 1 plug connection

- 1 Brown
  - 2 White
  - 3 Blue
  - 4 Black
- $R_L$  Load resistance (contactor, relay, etc.)

## 6 Set up

### 6.1 Indication of the switching status

The switching status of the electronics can be checked via the signal lamps (LEDs) integrated in the upper part of the housing.

The signal lamps have the following meaning:

- Green lights - voltage supply connected
- Yellow lights - vibrating element covered
- Red lights briefly - function test during instrument start (for 0.5 s)
- Red lights - shortcircuit or overload in the load circuit (sensor output high-impedance)
- Red flashes - vibrating frequency of the sensor deviates (sensor output high-resistance)

### 6.2 Function test

VEGASWING 51 has an integrated test switch which can be activated magnetically. Proceed as follows to test the instrument:

- Hold the test magnet (accessory) to the magnet symbol on the instrument housing

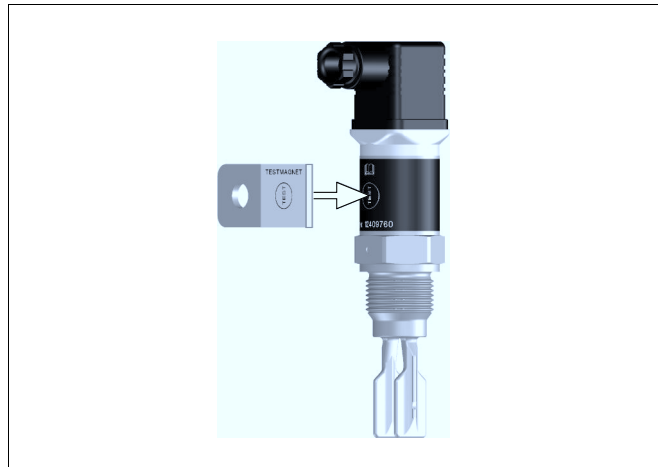


Fig. 11: Function test

The test magnet changes the current switching condition of the instrument. You can check the change on the signal lamp. Please note that the connected instruments are activated during the test.

If VEGASWING 51 does not switch over after several tests with the test magnet, you have to check the plug connection and the connection cable and test the instrument again. If there is no switching function, the electronics will be defective. In this case you have to exchange the electronics or return the instrument to our repair department.















**Caution:**

It is absolutely necessary that you remove the test magnet after the test from the instrument housing.

**6.3 Function chart**

The following chart provides an overview of the switching conditions depending on the adjusted mode and level.

	Level	Switching status	Control lamp Yellow - coverage	Control lamp Green - voltage indication	Control lamp Red - fault signal
Mode max.		closed	○		○
Mode max.		open			○
Mode min.		closed			○
Mode min.		open	○		○
Failure	any	open	any		

## 7 Maintenance and fault rectification

### 7.1 Maintenance

If the instrument is used properly, no special maintenance is required in normal operation.

### 7.2 Remove interferences

#### Reaction when malfunctions occur

The operator of the system is responsible for taking suitable measures to rectify faults.

#### Failure reasons

VEGASWING 51 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

#### Fault rectification

The first measure to be taken is to check the output signal. In many cases, the causes can be determined this way and the faults rectified.

#### 24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is available to you 7 days a week round-the-clock. Since we offer this service world-wide, the support is only available in the English language. The service is free of charge, only the standard telephone costs will be charged.

#### Checking the switching signal

Error	Cause	Removal
Green signal lamp off	Voltage supply interrupted.	Check the voltage supply and the cable connection
	Electronics defective	Exchange the instrument or send it in for repair
Red signal lamp lights (switching output high-impedance)	Error with the electrical connection	Connect the instrument according to the wiring plan
	Shortcircuit or overload	Check the electrical connection

Error	Cause	Removal
	Red signal lamp flashes (switching output high-impedance)	Vibrating frequency out of specification
Check the vibrating element on buildup and remove it		
Buildup on the vibrating element		Check the vibrating element and the sensor if there is buildup and remove it
Vibrating element damaged	Check if the vibrating element is damaged or extremely corroded	

**Reaction after fault rectification**

Depending on the failure reason and measures taken, the steps described in chapter "Set up" must be carried out again, if necessary.

**7.3 Instrument repair**

If a repair is necessary, please proceed as follows:

You can download a return form (23 KB) from our Internet homepage [www.vega.com](http://www.vega.com) under: "Downloads - Forms and certificates - Repair form".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please ask the agency serving you for the address of your return shipment. You can find the respective agency on our website [www.vega.com](http://www.vega.com) under: "Company - VEGA worldwide"

## 8 Dismounting

### 8.1 Dismounting steps

**Warning:**

Before dismantling, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

### 8.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the electronics to be easily separable.

**WEEE directive 2002/96/EG**

This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

## 9 Supplement

### 9.1 Technical data

#### General data

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Material 316L corresponds to 1.4404 or 1.4435

Materials, wetted parts

– Tuning fork	316L
– Process seal	Klingsil C-4400
– Process fittings	316L

Materials, non-wetted parts

– Housing	316L and plastic PEI
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Weight approx. 250 g (9 oz)

Process fittings

– Pipe thread, cylindrical (DIN 3852-A)	G½ A
– American pipe thread, conical (ASME B1.20.1)	½ NPT

Torque - process fitting

– Thread G½ A, ½ NPT	50 Nm (37 lbf ft)
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#### Measuring accuracy

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Hysteresis	approx. 2 mm (0.08 in) with vertical installation
Switching delay	approx. 500 ms (on/off)
Frequency	approx. 1100 Hz

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#### Ambient conditions

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Ambient temperature on the housing	-40 ... +70 °C (-40 ... +158 °F)
Storage and transport temperature	-40 ... +80 °C (-40 ... +176 °F)

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#### Process conditions

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Process pressure	-1 ... 64 bar/-100 ... 6400 kPa (-14.5 ... 928 psig)
Process temperature	-40 ... +100 °C (-40 ... +212 °F)

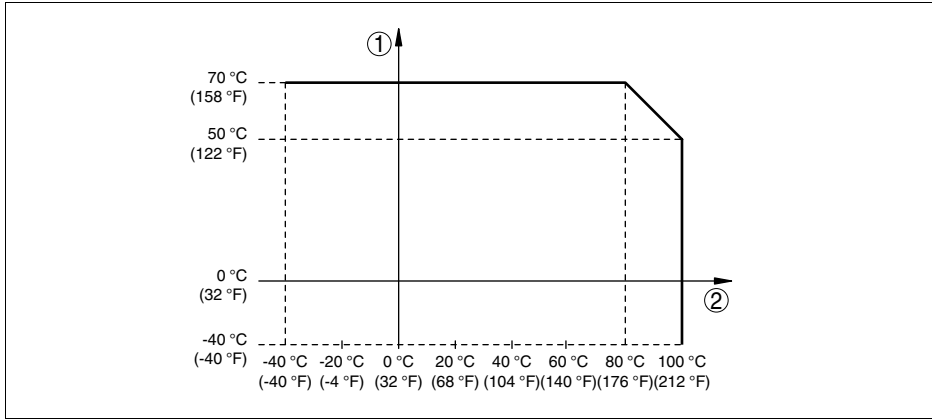


Fig. 30: Dependency ambient temperature to process temperature

- 1 Ambient temperature in °C (°F)
- 2 Process temperature in °C (°F)

Viscosity - dynamic	0.1 ... 10000 mPa s
Flow velocity	max. 6 m/s (with a viscosity of 1 mPa s)
Density	0.7 ... 2.5 g/cm <sup>3</sup> (0.025 ... 0.09 lbs/in <sup>3</sup> )

**Operation**

Plug connections	Specification see " <i>Connecting to power supply</i> "
Signal lamps (LED)	
– Green	Voltage supply on
– Yellow	Vibrating element covered
– Red	Failure

**Output variable**

Output	Transistor output PNP
Load current	max. 250 mA (output, permanently short-circuit proof)
Voltage loss	< 2 V
Turn-on voltage	< 34 V DC
Blocking current	< 10 µA
Mode	
– Min./Max.	Changeover by electronic connection
– Max.	Overflow protection
– Min.	Dry run protection

**Voltage supply**

Operating voltage	9.6 ... 35 V DC
Power consumption	max. 0.5 W

**Electromechanical data**

## Valve plug ISO 4400

– Wire cross-section	1.5 mm <sup>2</sup> (0.06 in <sup>2</sup> )
– Cable outer diameter	4.5 ... 7 mm (0.18 ... 0.28 in)

## Valve plug ISO 4400 with IDC method of termination

– Wire cross-section	for wire cross-section of 0.5 ... 1 mm <sup>2</sup> (0.02 ... 0.04 in <sup>2</sup> )
– Single wire diameter	> 0.1 mm (0.004 in)
– Wire diameter	1.6 ... 2 mm <sup>2</sup> (0.06 ... 0.08 in <sup>2</sup> )
– Cable outer diameter	5.5 ... 8 mm (0.22 ... 0.31 in)
– Connection frequency	10 x (on the same cross-section)

**Electrical protective measures**

## Protection rating

– Valve plug ISO 4400	IP 65
– Valve plug ISO 4400 with IDC method of termination	IP 67
– M12 x 1 plug connection	IP 66/IP 67 or IP 68 (0.2 bar)

Overvoltage category III

Protection class II

**Approvals**

Instruments with approvals can have different technical data depending on the version.

That's why the associated approval documents have to be noted with these instruments. They are part of the delivery or can be downloaded under [www.vega.com](http://www.vega.com) via "VEGA Tools" and "serial number search" as well as via "Downloads" and "Approvals".

## 9.2 Dimensions

### VEGASWING 51 - standard version

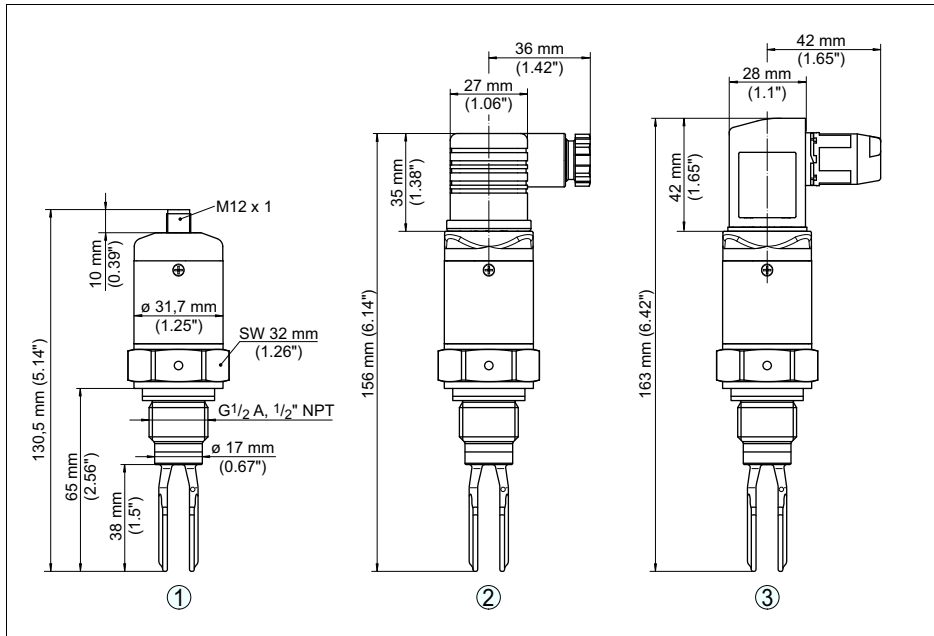


Fig. 31: VEGASWING 51 - standard version

- 1 Thread G $\frac{1}{2}$  A (DIN ISO 228/1), 1/2 NPT (M12 x 1)<sup>1)</sup>
- 2 Thread G $\frac{1}{2}$  A (DIN ISO 228/1), 1/2 NPT (valve plug ISO 4400)
- 3 Thread G $\frac{1}{2}$  A (DIN ISO 228/1), 1/2 NPT (valve plug ISO 4400 with DC method of termination)

<sup>1)</sup> Keep in mind that the total length is extended by the plug connection.

### 9.3 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see <http://www.vega.com>.

Only in U.S.A.: Further information see patent label at the sensor housing.

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